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Interdisciplinary management of hemimandibular hyperplasia in skeletal and dentoalveolar class II malocclusion: A case report

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ABSTRACT

Hemimandibular hyperplasia (HH) is a facial asymmetry characterized by 3-dimensional unusual growth of half of the mandible which may develop in any age group. Treatment includes primarily surgical, but various treatment options are given in the literature, like partial or high condylectomy with orthognathic surgery and inferior border osteotomy of body of the mandible. This case report of 23-year-old female patient with a history of left-side facial asymmetry. After clinical and radiological examinations standard surgical-orthodontic treatment plan was proposed to the patient. The patient had undergone surgical procedure of high condylectomy and mandibular inferior border recontouring followed by orthodontic treatment which includes initial levelling and alignment. After alignment, patient had undergone mandibular advancement with BSSO (bilateral sagittal split osteotomy). Orthodontic treatment was continued with deep bite correction and final settling of occlusion. The final result obtained with interdisciplinary management by oral surgery and orthodontist was aesthetic for the patient, although slight asymmetry of the chin persisted.

Keywords: Hemimandibular hyperplasia, facial asymmetry, condylectomy, bilateral sagittal split osteotomy, inferior border recontouring

1. INTRODUCTION

Hemimandibular hyperplasia (HH) is a developing facial asymmetry that is characterized by 3-dimensional unusual growth of half of the mandible. The affected side involves the angle, condyle, body and ramus terminating at the symphysis region (Bennett & Goonewardene, 2016; Chen et al., 1996). The clinical features of the deformation results in the ipsilateral abnormal growth of the mandible and canting of the occlusal plane, with a chin deviated to the opposite side (Chen et al., 1996). The etiology is still unknown and the root biology is not completely understood with the genetic, traumatic, hormonal,

or mechanical factors that can be suspected (Nandre & Patil, 2016). Different classifications are given for condylar hyperplasia according to clinical and radiologic features associated with the morphological changes. They had given a classification of Condylar hyperplasia as hemimandibular elongation, hemimandibular hyperplasia (HH) and a hybrid of both (Obwegeser & Makek, 1986).

Treatment includes primarily surgical, but various treatment options are given in the literature, relative controversies are also there like partial condylectomy with orthognathic surgery and inferior border osteotomy of a body of the mandible, or with orthognathic and inferior border osteotomy of the body without condylar intervention (Abotaleb et al., 2021; Kim et al., 2019; Bertolini et al., 2001; Ferguson, 2005; Angiero et al., 2009). Whereas, in adolescents, it is also confusing whether early condylar intervention should be done or wait till the growth cessation. The present study demonstrated the experience of our institute of the treatment of Hemimandibular hyperplasia in adults with combined surgical and orthodontic approach.

2. CASE PRESENTATION

A 25-year-old female reported to the Department of Orthodontics with the chief complaint of poor aesthetics. No relevant medical, surgical and personal history were given by the patient. On extraoral examination, facial asymmetry was noticed and can't was present on the right side, vertical increased of lower facial height on the right side (Figure 1. On intraoral examination, Class II relation molar and canine relation were present, lower anterior crowding and complete deep bite were seen (Figure 2).

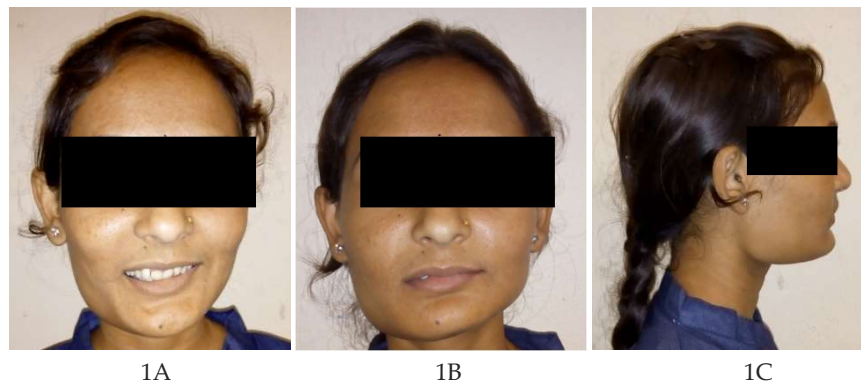


Figure 1 Pre-treatment Extra oral A) Frontal B) Smiling C) Lateral view



Figure 2 Pre-treatment Intra oral A) Right lateral B) Frontal C) Left lateral D) Maxillary occlusal E) Mandibular occlusal

Radiographically, in lateral cephalometry; skeletal class II, horizontal growth pattern, retrognathic mandible, retroclined upper anteriors were observed. In OPG; increased height on the right side of mandibular body, ramus, condyle abnormal v shaped sigmoid notch was noticed on the right side. In PA ceph; volume of the mandible was increased on the right side (Figure 3). Bone

scan impression showed mildly increased perfusion and focal osteoblastic overactivity involving right TM Joint region. Likely represents active phase of condylar hyperplasia.

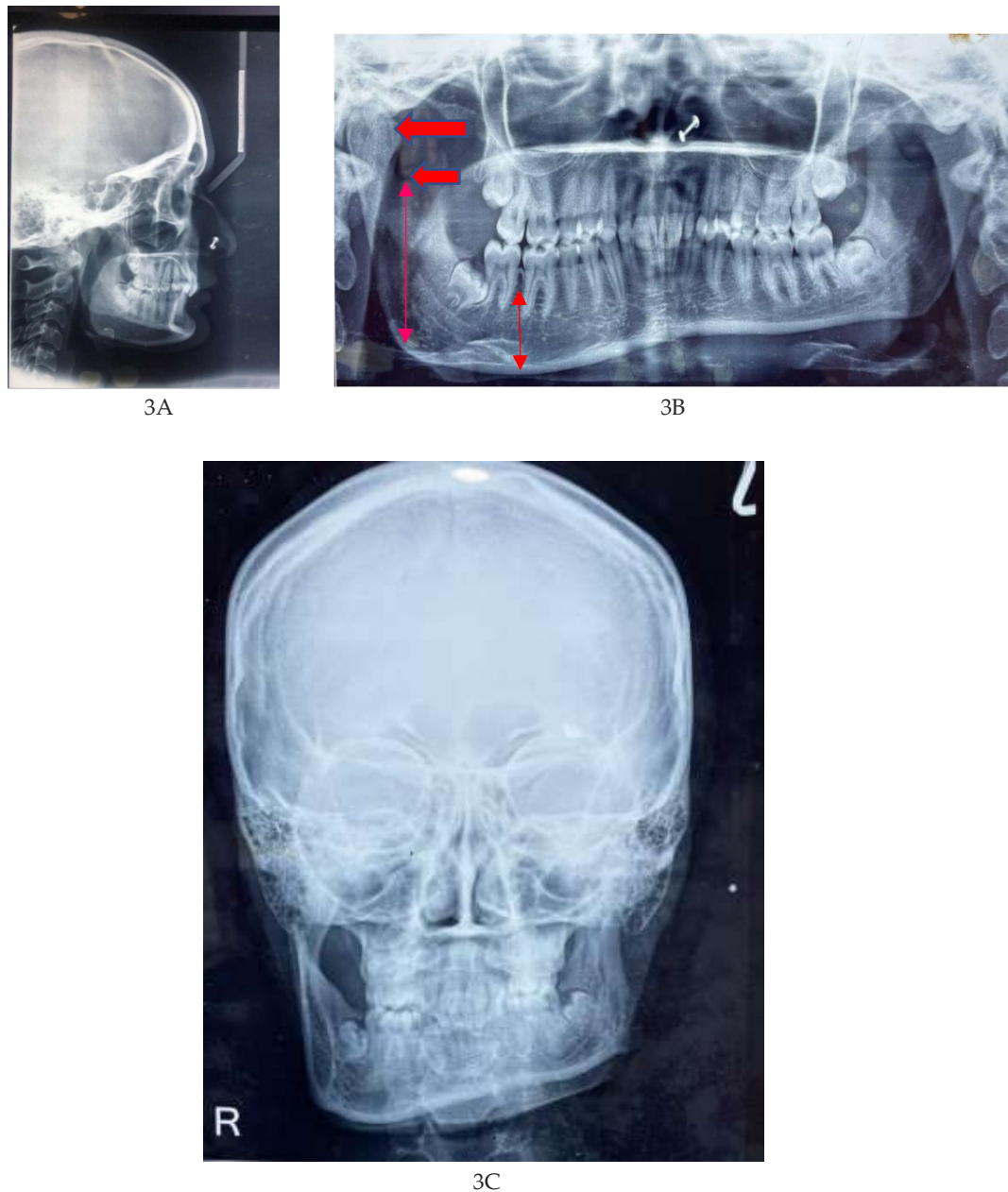


Figure 3 A) Lateral cephalometry B) Orthopantomogram C) PA cephalometry

After the examination of the following radiographs, the radiographic diagnosis was given as hemimandibular hyperplasia on the right side. Treatment objectives were; to achieve facial symmetry, to correct skeletal and dental class II relation, to correct deviated and prominent chin, mandibular advancement bilaterally with BSSO, to correct retroclination of upper central incisors, and to correct a deep overbite.

Treatment plan includes high condylectomy on right side, inferior border shaving to correct the height of mandibular body, mandibular advancement by Bilateral sagittal split osteotomy followed by reduction genioplasty for correction of prominent chin. Orthodontic plan includes initial levelling and alignment for correction of retroclined upper anterior teeth, correction of deep bite, settling of occlusion after BSSO, finishing and detailing.

Treatment progress includes bonding was done in the upper arch. After bonding 3D stereolithographic model was prepared for analysis and planning of mock surgery. Length of the corpus of mandible measured on the unaffected side and transferred to the affected side (Figure 4A, B).

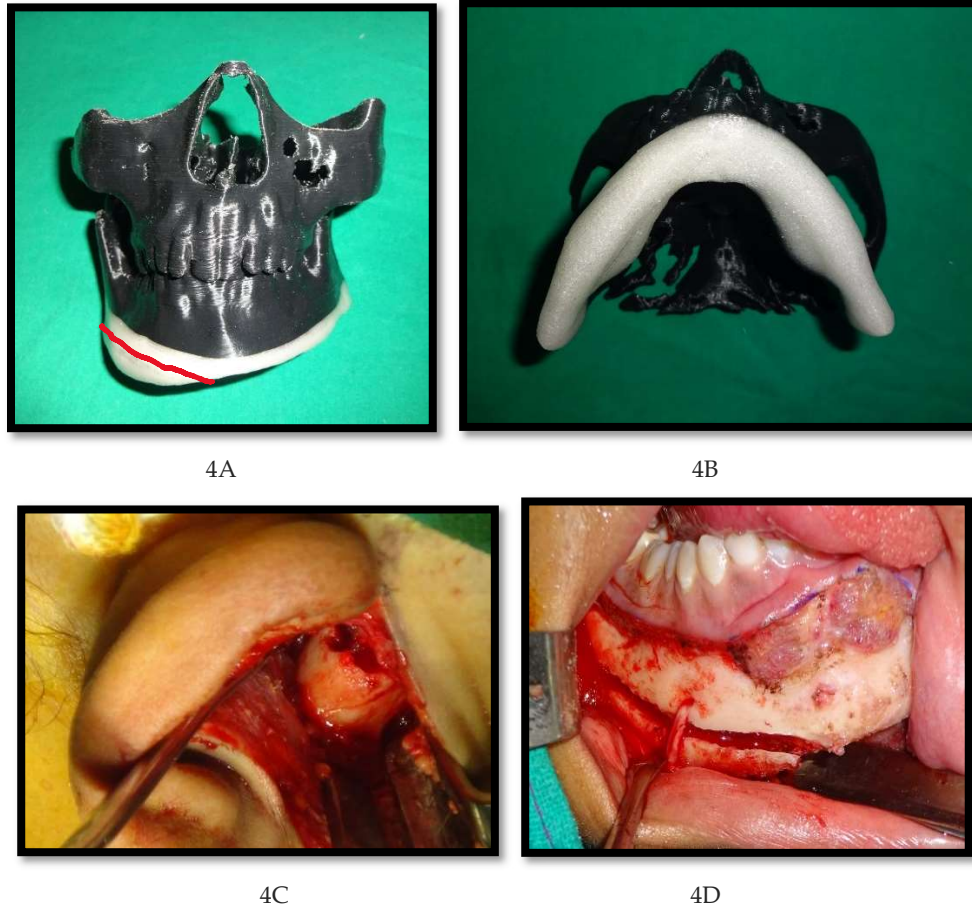


Figure 4 A and B) 3D stereolithographic model C) High condylectomy D) Inferior border shaving

After the mock surgery, surgical plan was executed. Orthomorph correction was done which includes high condylectomy and mandibular inferior border osteotomy (4C, D). 4-5 months after surgery, initial levelling and alignment was done with 0.014, 0.016, 0.016×0.022 and 0.017×0.025 NiTi. Mid-treatment photographs show class II molar and canine relation with increased overjet of 6mm (Figure 5A-C). OPG shows symmetrical mandibular condyle, angle, ramus and body on both sides (Figure 5D). Lateral cephalometry shows skeletal class 2 bases, normal upper incisors, rotation of the mandible but still horizontal growth pattern (Figure 5E).

After initial levelling and alignment, bilateral surgical split osteotomy was done for bilateral mandibular advancement. Surgical splint was fabricated before surgery (6A-C). 4mm of mandibular advancement was achieved with BSSO (7A, B).





Figure 5 Mid-treatment intraoral photographs and radiographs A) Right lateral B) Frontal C) Left lateral D) Orthopantomogram E) Lateral cephalogram

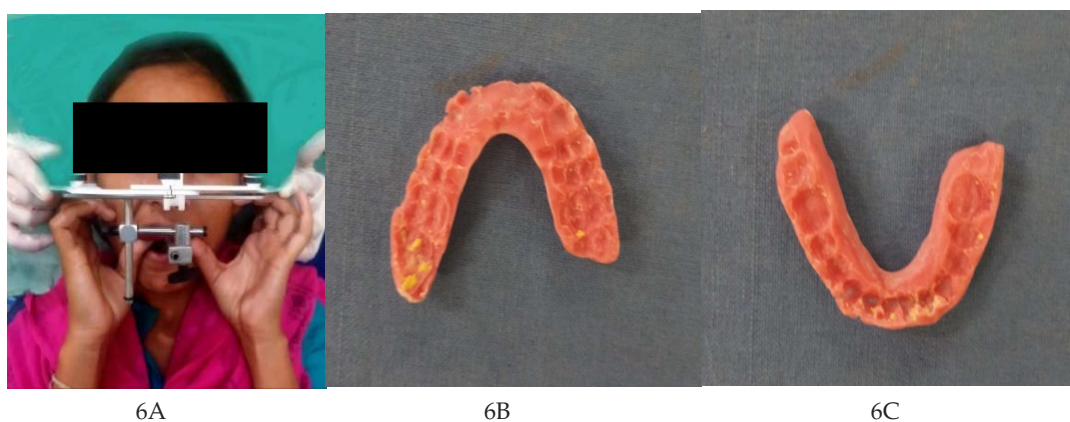


Figure 6 A) Face bow for Splint, B and C) Splint of upper and lower



Figure 7 A and B) Bilateral sagittal split osteotomy

After 3 months of BSSO, Orthodontic treatment was continued, deep bite was corrected with 0.017×0.025 and 0.019×0.025 stainless steel RCS wire. Class I molar and canine relation was achieved bilaterally. Settling of occlusion was done with 0.021×0.025 stainless steel wire (9 A-E). Extraoral, the facial profile was straight with correction of facial asymmetry (8A-C). Patient refused for reduction genioplasty.



Figure 8 Post-treatment photographs 8A: Smiling 8b: Frontal 8C: Lateral



Figure 9 Post-treatment 9A: Right lateral 9B: Frontal 9C: Left lateral 9D: Maxillary occlusal 9E: Mandibular occlusal

3. DISCUSSION

Hemi mandibular hyperplasia is an unusual growth of the hemimandible or half of one side of the mandible with facial esthetic and functional deformity. Clinically it can be seen as an enlargement of half of the mandible and can't of the occlusal plane (Nitzan et al., 2008). Pathogenesis of hemimandibular hyperplasia is hyperactivity of condyle which includes an active proliferation of condylar cartilage (Saridin et al., 2009; Gray et al., 1990; Matteson et al., 1985; Lippold et al., 2007). In this case report, after radiographic and bone scan examination hemimandibular hyperplasia was seen on the right side (Tuncer et al., 2009).

The surgical procedure includes: A 3-dimensional stereolithographic model prepared before surgery and the site of the incision was marked in the model for mandibular inferior border osteotomy. High condylectomy and mandibular inferior border osteotomy were performed in the patient with the same measurement were done in the model. The osteotomy line should not injure the inferior alveolar nerve (Farina et al., 2019; Farina et al., 2016; Ferguson, 2005). Mid-treatment photograph shows class 2 molar and canine relation and increased overjet. BSSO was also done for mandibular advancement after initial levelling and alignment. BSSO was done to advance the Mandible followed by settling of occlusion in class I relation.

The treatment goal of HH was to correct the facial midline and occlusal plane. Sagittal split osteotomy with mandibular inferior border shaving and high condylectomy was necessary for achieving the goal. Some authors also supported condylectomy as a treatment of hemimandibular hyperplasia in adults (Obwegeser & Makek, 1986; Lippold et al., 2006; Nino-Sandoval et al., 2019; Posnick, 2014). However, Kim et al., (2019) indicated their experience treating adults with HH without the necessity for condylar surgery to prevent invasion in TMJ compartment. Lippold et al., (2006) advocated high condylectomy in HH treatment, resulting in

a stable mandible with no disturbance in function of TMJ. Xu et al., (2014) treated HH cases without condylectomy. They stated that because of the proximity of nerve to the lower margin, there were barriers in ensuring optimum symmetrical severe deformity correction.

Some authors aimed to enhance surgical outcomes through modifying surgical techniques like extending a vertical incisional line anterior towards the mental foramen but also simultaneously relocating the inferior alveolar nerve, while others implemented the application of advanced software technology like 3-dimensional assessment and surgical planning. In this case report, the typical HH treatment plan completely preserved the affected condyle is completely preserved (Tuncer et al., 2009).

The reasons for the surgical plan are that the patient was an adult, with no progress of malformation in the past 5 years; (2) the mouth opening was normal; (3) TMJ function was normal, no temporomandibular disorder or no findings of ankylosis radiographically. Both high condylectomy and orthognathic surgery are viable methods of treatment of Hemimandibular hyperplasia in adults. High condylectomy in results in the disease elimination and improvement in aesthetics with constant follow-up of orthodontists and surgeons required according to Abotaleb et al, (2021).

4. CONCLUSION

Hemimandibular hyperplasia is a challenge for both oral surgeons and orthodontists. Treatment is a multidisciplinary approach to correct facial asymmetry by surgery and settling of occlusion orthodontically. The success rate depends on proper orthomorphologic surgery includes high condylectomy and inferior border shaving, alignment of the arches, followed by BSSO which includes mandibular advancement and chin correction.

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Author Contributions

Each author has contributed equally.

Informed consent

Written & Oral informed consent was obtained from the participants included in the study.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data collected during this study are available upon reasonable request from the corresponding author.

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